

## ACUTE METASTATIC SPINAL EPIDURAL ABSCESS

By WILLIAM J. VAN DEN BERG, M.D.  
Sacramento

DISCUSSION by Howard W. Fleming, M.D., San Francisco; Carl W. Rand, M.D., Los Angeles; F. L. Reichert, M.D., San Francisco.

**A**CUTE spinal epidural abscess, metastatic in origin, is undoubtedly more common than a review of the literature seems to indicate. There have been two cases in this vicinity within the past two months. The few papers published, describing this definite clinical entity, have endeavored to focus the attention of physicians in general on the signs and symptoms which point so clearly to an abscess in the spinal epidural space.

### ETIOLOGY

The etiology is similar to that of perinephric abscess. One can usually obtain a history of a previous infection elsewhere, usually a furuncle or subcutaneous abscess, occurring a short time before the onset of the epidural abscess. In studying the previously reported cases, it is interesting to note the high percentage with a trifling back injury in addition to a previous infection. In a few cases there is a history of a back injury without an infection history. The age incidence has been from two to fifty-five years.

### DIAGNOSIS

The patient is acutely ill, and has a moderate or high fever and hyperleukocytosis. One of the distinctive symptoms of this condition is that the patient will complain of severe root or girdle pains radiating from the back to the front of the chest, or to the front of the abdomen, or around the pelvis and down the thighs, depending upon the segmental location of the abscess. Upon examination, one finds extreme tenderness of the spinous processes over the affected area, accompanied by spasm of the adjacent back muscles. Stiffness of the neck and bilateral Kernigs are present—when the abscess is in the lumbar region the Kernigs are extreme, the neck stiffness slight.

These are early signs, and if the condition is untreated they are soon complicated by signs of cord involvement—paraplegia, sphincter disturbances, sensory loss, and, as the abscess advances up the space, an advance of the sensory loss, and paralysis will be noted.

A spinal tap is essential to confirm the diagnosis, though this admittedly increases the hazards to the patient. When the abscess is in the lumbar space, there is grave danger that the spinal needle may carry the infection from the epidural space into the subarachnoid space, and thus initiate a meningitis. However, the lumbar space is over one centimeter in depth, and is distended with pus, and one can successfully pierce this space by a careful tap without entering the subarachnoid space. In fact a routine spinal tap is apt to enter this space only and evacuate pus, and if the operator does not have an epidural space abscess in mind he is likely to make a diagnosis of purulent meningitis. Any doubt in the matter can be dispelled by a

recheck through the cistern which will show a practically normal spinal fluid.

When the abscess is in the dorsal epidural space, a block is produced early; a positive Queckenstedt is present; and the Froin syndrome will be noted—the spinal pressure will be low or quickly fall because of the block; the fluid will be yellow and will clot spontaneously owing to its greatly increased protein content.

### ANATOMY

The epidural space, according to Dandy's<sup>1</sup> study of its anatomy, is formed by the division of the dura into two halves at the foramen magnum: the inner half, running down the canal, acts as the dura proper while the outer half serves as the periosteum of the vertebrae; and in between these two layers is the epidural space. This space contains fat, connective tissue, and venous and arterial plexus. Above the seventh cervical vertebra the space is merely potential, the two layers being in contact. But from the seventh cervical vertebra downward this space has a depth varying between .5 to .75 centimeters in the upper dorsal region, narrowing slightly in the lower dorsal and upper lumbar regions, and deepening to over one centimeter in the lower lumbar and upper sacral regions. The space is present only dorsal to the nerve attachments.

### TREATMENT

There is only one successful treatment—a laminectomy—which should be done as soon as a positive diagnosis is made. And the incision should be packed wide open. In several cases reported in the literature, a second operation was necessary because of pus pocketed in the spaces just above and below the limits of the original laminectomy. Operation offers a cure even in the presence of cord involvement (paraplegia), if the latter has not been present too long. Otherwise there is some residual paralysis after recovery from the infection.

I am convinced that the use of staphylococcus antitoxin in my case, following the laminectomy, was of distinct value.

### REPORTS IN THE LITERATURE

Slaughter, Fremont-Smith, and Monroe<sup>2</sup> reported one patient who recovered following a laminectomy, and in reviewing the literature found twenty-nine cases reported with six recoveries—two of the six with residual paralysis of the lower extremities.

Cathey<sup>3</sup> reported one patient who was operated on and died; but as he states there was also osteomyelitis of the spinous processes, we must conclude the abscess was by direct extension and cannot, therefore, include it in our metastatic cases.

Stanley<sup>4</sup> reported two cases with recovery. In neither was there any history of subcutaneous abscess or questionable focus preceding the epidural abscesses. In both cases, however, there was a history of a trifling back injury.

Gasul and Jaffe<sup>5</sup> reported three cases in children, with two recoveries, and in an exhaustive bibliography reviewed the entire literature, begin-

ning with the first reported case by Morgagni (1682-1771). Up to July 1, 1936, and including the two cases reported herein, there have been seventy-one cases reported in the entire literature. Twenty of these patients recovered, five of whom had some residual paralysis.

In reviewing the literature one is impressed by what seems to be two distinct eras in the diagnosis, treatment, and prognosis of these patients. The first era, from the time of Morgagni to the end of 1928, was despairing: out of thirty-six cases reported only one recovered (Pulvirenti<sup>6</sup>)—a mortality of over 97 per cent. In the second era, beginning in 1929, there is a distinct change for the better. Out of thirty-five cases reported in this second period, nineteen of the patients recovered—a mortality of 46 per cent. And this brighter new era is due chiefly to the work of such pioneers as Dandy,<sup>1</sup> Mixter,<sup>7</sup> Smith,<sup>8</sup> MacDonald,<sup>9</sup> Ely,<sup>10</sup> and others.

#### REPORT OF CASES

**CASE 1.**—The first case of epidural spinal abscess reported herein is one in which the patient had a subcutaneous abscess two weeks before his entry into the hospital. A laminectomy was done and the patient made a complete recovery. Howard W., a well-developed and nourished high school athlete, age seventeen years, was admitted to the Sacramento Hospital June 11, 1936, with an admitting diagnosis of back sprain. He stated that six days previously he fell and hurt his back slightly, but thought nothing of it at the time. The following morning he had pain in his lumbar region, which gradually increased. For the past three days the lumbar pain had been severe, with sharp, shooting pains referred down both thighs anteriorly. He had had occasional headaches, but no nausea or vomiting. His mother stated he had been very irritable, and had had a high fever for the past four days. On further questioning, he recalled having had a subcutaneous abscess of his right arm two weeks before his present illness.

The abnormal physical findings were a moderately stiff neck, extreme bilateral Kernigs, marked spasm of the lumbar muscles, and extreme tenderness to pressure over the lumbar spinous processes. At entry his temperature was 102.6; pulse, 110; respirations, 24. Urine had one plus albumen. Blood hemoglobin was 75 per cent; white blood cell count, 15,400. An x-ray of the spine was negative.

A lumbar puncture in the third interspace evacuated about two drams of thick pus. Laboratory smear of the pus showed an abundance of *Staphylococci* which, on culture, proved to be *Staphylococcus aureus*. A provisional diagnosis of acute *Staphylococcus meningitis* was made, and the case was referred to me. However, a reexamination and study of the patient made me question this diagnosis. Mentally, the patient was too alert for any meningitis of a degree revealed by the spinal needle. Furthermore, the girdle pains radiating around the pelvis and down the legs, indicating a nerve-root irritation which was definitely localized in the lumbar region strongly suggested a lumbar epidural abscess. To confirm my diagnosis, I did a cisternal tap by which I obtained a perfectly clear, normal, cerebrospinal fluid.

Operation was performed about twelve hours after entry into the hospital, and about six and one-half days after the onset of symptoms. A laminectomy of the second, third, fourth, and fifth lumbar vertebrae was done, the initial incision being just to the left of the spinous processes, freeing and retracting the periosteum and muscles outwardly to the left; then severing the spinous processes at their bases and retracting them with their attached ligaments, muscles, and outer periosteal layer of the right laminae to the right. As soon as the epidural space was opened, about a dram of thick pus was released. Culture of the pus showed *Staphylococcus aureus*. The laminae of the second, third fourth, and fifth lumbar vertebrae were removed, releasing about two drams more of thick pus, and, as there was a small collection of pus epidurally in

the upper end of the sacral canal, the first sacral spinous process and laminae were also removed. There was no osteomyelitis of the vertebral processes, nor was there any granulation tissue in the epidural space. The wound was packed wide open. On each day for five days succeeding the operation, the patient was given intramuscular injections of 10,000 units of *Staphylococcus antitoxin*. His temperature went up to 104 following the operation, gradually dropped to normal on the fourth day, and stayed about normal thereafter. On the thirty-sixth postoperative day a secondary closure was made under local anesthesia. The patient was discharged August 6, 1936, completely recovered.

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**CASE 2.**—While I was preparing to report the above case, a pathologist called my attention to another case of epidural spinal abscess which he had on the autopsy table. And while I did not see this case before autopsy, I have reviewed the case history notes and present a résumé herein. D. M., white, female, age sixteen, was injured in an automobile accident August 1, 1936, and sustained a fracture of the right ankle. Physical examination was otherwise negative, except for notched upper incisor teeth (Hutchinson). Her urine was negative; white blood cell count, 16,500; blood, Kahn and Wassermann four plus. The patient had an upper respiratory infection, and spinal anesthesia was used on August 4 in setting the fractured ankle. On the second postoperative day she began to run a daily septic temperature, with its maximum between 101.6 and 102.6 degrees. On the fifth postoperative day she began to complain of severe girdle pains, radiating to the front of the lower chest and upper abdomen, and repeated examinations of the chest and abdomen failed to account for these pains. On the eighth postoperative day she insisted on sitting up in a wheel chair, and a few minutes later complained of numbness and weakness of her legs, which later in the day developed into a complete paralysis and sensory loss below the costal margin. White blood cell count was 57,400. This sensory loss and paralysis gradually ascended. The patient died within twenty-four hours of the onset of the paralysis. Autopsy showed an abscess of the entire epidural space from the foramen magnum downward into the sacrum, accompanied by cord-softening. Culture of the pus showed an abundance of *Staphylococcus aureus*.

Medico-Dental Building.

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#### DISCUSSION

HOWARD W. FLEMING, M.D. (384 Post Street, San Francisco).—Doctor Van Den Berg has emphasized the similarity of acute epidural abscess syndrome to that of perinephritic abscess. As regards the etiology the comparison is most apt, and properly stresses the relationship of local trauma and *staphylococcus* infection. Only too frequently the chief attention is focused on the site of primary infection or to the region of the referred pain,

until far-advanced cord symptoms make the diagnosis. In a recent case, paraplegia was considered an hysterical manifestation before proper surgical treatment was instituted.

The necessity of a thorough back examination in cases of adults complaining of thoracic and abdominal pain, is fully as real as in the child suspected of Pott's disease. Local tenderness to pressure or pounding over a spinous process is often a helpful diagnostic sign, and may be found several hours before the onset of cord symptoms. The following record of an unusual case illustrates this point.

A middle-aged man, with a moderately severe diabetes, had been operated on for a right mastoiditis. The post-operative course was difficult and interrupted by several minor complications. Several weeks after the operation the patient began to complain of pain, weakness and numbness of the left arm and hand. Early examination suggested the possibility of a stereognostic impairment, and the diagnosis of a right cerebral brain abscess suggested. The absence of stupor and signs of increased intracranial pressure made this diagnosis seem unlikely. The very definite tenderness of the cervical spine focused one's attention to that site. In a few hours it was possible to demonstrate a definite Brown-Séquard syndrome with a total block of the spinal canal. Operation revealed a very large epidural abscess in the cervical region.

The necessity for immediate operation in these cases should be emphasized. The cord signs are due to interference with circulation and a toxic softening of the cord as well as the direct pressure. If satisfactory drainage is not accomplished in the first few hours, the patient may have a permanent paraplegia. I feel a negative exploration is justified in an attempt to diagnose and treat this condition early in its course. Close observation and very frequent examination are fully as important in cases of suspected epidural abscess as in cases with a suspected surgical belly.

Doctor Van Den Berg's paper brings to our attention a syndrome that is probably far more frequent than we suspect, and one that is often diagnosed too late to allow effective treatment.

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CARL W. RAND, M.D. (523 West Sixth Street, Los Angeles).—There is now no doubt but that acute epidural abscess is a distinct clinical entity which can be diagnosed with unusual accuracy. The patients almost invariably have an infection elsewhere in the body. We have seen epidural abscesses secondary to a carbuncle of the neck, a boil of the leg, a furunculosis and osteomyelitis of the humerus.

In my experience the initial symptom has been a terrific pain in the back. This is of great intensity and is localized over the site of the abscess. The motor symptoms usually appear before the sensory. The latter, however, may become complete within a few hours after the onset. Slaughter, Fremont-Smith, and Munro have pointed out that a complete spinal block may be present before the motor and sensory symptoms have become advanced. Basing the location of the abscess on the tenderness in the back and the presence of a positive Queckenstedt's test, they have been able to drain such abscesses before severe damage to the spinal cord has occurred. This is important, for in advanced cases where damage to the cord is extensive one may expect little, if any, recovery from the symptoms. Allen and Kahn have outlined in considerable detail the structural changes which may occur in the spinal cord in such cases. Their illustrations show not only edema, but cystic areas of degeneration and necrosis. In some of their sections the cord near the posterior columns shows a honeycombed appearance. Again degeneration of the anterior horn cells is shown. These changes appear relatively early, and make it imperative that surgery should be instituted before paraplegia has appeared. Unless operation is employed early, damage to the cord will be more irreparable.

As Doctor Van Den Berg states, these cases are now being more favorably treated than heretofore. Epidural abscesses are more common than have been supposed, and in the future many more cases should be accurately diagnosed. In the past many of them presumably have been hidden under the name of "transverse myelitis."

F. L. REICHERT, M.D. (Stanford University School of Medicine, San Francisco).—The importance of recognizing and treating properly the acute spinal epidural abscesses is emphasized in Doctor Van Den Berg's paper. He has clearly and briefly summarized our knowledge of this condition and pointed out the essential diagnostic findings, indicating the important and distinctive symptom of severe root or girdle pains as an early complaint.

The findings at autopsy, in the second case, of epidural pus extending the entire length of the spinal canal, would make the pathologic condition more extensive than an abscess.

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DOCTOR VAN DEN BERG (Closing).—Early diagnosis and treatment are essential to save life and cord function. To save life after we get some degree of the permanent cord damage described in Doctor Rand's discussion is, at best, an unhappy victory. Doctor Fleming adds an interesting successful case to the growing list. Epidural abscess, as Doctor Reichert points out, is not an accurate pathologic description—empyema of the epidural space is perhaps a more exact pathologic diagnosis—but the former has been accepted by the profession and will undoubtedly remain.

## THE LURE OF MEDICAL HISTORY†

### PRACTICE AMONG THE ESKIMOS

By BRUCE H. BROWN, M.D.

*San Ysidro*

IN preparing this paper, I have drawn mostly from memory. Having been in government employ,\* all my case records and reports became the property of the Government.

Practice among the Eskimos is the subject of my paper, but I shall also speak of the customs, especially those akin to disease, which will tend to give some insight into the Eskimo character.

### ON FEEDING OF CHILDREN

To render young children strong and healthy, these savages feed them the flesh of young pups or dog's excrements mixed with their food, which sometimes causes their death. I have in mind a case of epithelioma of the lip (one of two cases of cancer seen in five years), which I had treated, of course, unsuccessfully. The native becoming discouraged, drank, either on the advice of the medicine man or some ignorant white, a mixture of dog urine and gunpowder. It killed him.

Parents who have lost several children give the surviving ones to some childless couple who, by adopting them, save them from the death to which they are doomed in their own family. This plan may work well in cases in which the parents are negligent, or too stupid to take proper care of the children, or are tuberculous; provided, the adoptive ones are not the same. But experience shows that the mortality of adopted children is not noticeably less than that of others.

### BOILS

To cure permanently a crop of successive boils, to which these natives are not infrequently sub-

†A Twenty-Five Years Ago column, made up of excerpts from the official journal of the California Medical Association of twenty-five years ago, is printed in each issue of CALIFORNIA AND WESTERN MEDICINE. The column is one of the regular features of the Miscellany department, and its page number will be found on the front cover.

\*Editor's Note.—Dr. Bruce H. Brown was formerly a passed assistant surgeon in the United States Public Health Service.